

REMARKS

Claims 1 - 22 are pending in the application. Claims 1 - 13 have been amended.

Claim Amendments

Claims 1 and 13 have been amended to clearly claim the Applicant's invention. Support for the amendments to the claims is provided in the paragraph beginning line 4 of page 7 of the originally filed specification, and in Figure 2 of the originally filed drawings. No new matter has been added.

Claims 2-12 have been amended to present additional limitations in structural form, in order to obviate the Examiner's objections under 37 CFR 1.75(c).

Claim Rejections – 35 U.S.C. §102

The present invention relates to activated sludge treatment of sewage. Prior art devices, known as oxidation ditches, comprise an oval "race-track" in which the sewage and activated sludge (mixed liquor) is circulated and aerated by a rotor. However, this design had disadvantages as it is difficult to circulate the mixed liquor at the appropriate speed so that the various biological processes can occur as well as ensuring that the biological organisms remain in suspension.

Alternatively the oxidation ditch may have aerators that operate on a timed basis to provide aerobic and anoxic periods of a specific ratio. These systems are inflexible as the amount and condition of the incoming sewage affects how much aeration is required. Thus, the sewage may not be completely treated or, if the load is low, operation of the aerator when it is not required adds to the running expenses of the treatment plant. Other devices use dissolved oxygen (DO) meters to control the cycles. When certain levels are reached, the successive phase is begun. However, these systems also do not provide effective treatment of sewage during variations in load nor allow for inefficiencies that are inherent in many aeration systems due to slowness in response.

The present invention provides effective and efficient treatment of sewage despite variations in load and compensates for any inertia or slowness in response by the aerator. The fully mixed reactor of the present invention has an operative

aerating phase that includes a variable period, in which a specific DO level is reached, which is followed by a period of predetermined time and then an inoperative phase that includes a variable period, in which a lower DO level is reached, which is followed by an anoxic period of predetermined time. This system ensures that the sewage is treated appropriately for its condition and that it is subject to an effective cycle of aerobic and anoxic phases having appropriate DO levels in each.

Claims 1 and 13 now clearly state that the fully mixed reactor provides sludge treatment that comprises an operative phase that includes an aerobic period for a predetermined time that commences when a first dissolved oxygen level is reached and an inoperative phase that includes an anoxic period for a predetermined time that commences when a second, lower, dissolved oxygen level is reached. The claimed predetermined aerobic and anoxic time periods that follow periods in which a certain dissolved oxygen level is reached enable the reactor to effectively treat sewage during variations in load and to compensate for any inertia or slowness in response by the aerator.

Reconsideration and withdrawal of the rejection of claims 1-13 and 15-16 under 35 U.S.C. §102(b) as being anticipated by US Patent No. 4,655,925 to Tabata et al is respectfully requested.

Tabata et al discloses a method for removing nitrogen and phosphorous based compounds from waste water, in an activated sludge tank with a series of agitating and aerating steps that are simply timer controlled. A dissolved oxygen (DO) meter is used to vary the flow rate of the aerator to maintain DO levels over successive cycles. Alternatively, Tabata et al suggests that the aerator may be operated intermittently in order to maintain DO levels. Thus, Tabata et al does not disclose or suggest treatment of sewage in which aerobic or anoxic periods of predetermined time are initiated after certain DO levels are reached, nor does it teach towards it.

In order for anticipation to exist, a reference must teach each and every element of a claimed invention. As Tabata et al differs from the present invention for at least the reasons discussed above, Tabata et al, does not anticipate claims 1 and 13. Tabata et al also does not anticipate claims 2-12 and 15-16 since these claims depend from either claim 1 or claim 13.

Reconsideration and withdrawal of the rejection of claim 1 – 13 and 15 – 16 under 35 U.S.C. 102(b) as being anticipated by Japanese patent No. 5-237496 to Kubota is respectfully requested.

Kubota suggests a sewage treatment tank in which successive aerobic and anaerobic phases are operated in a specific ratio on a timed basis. A DO meter may be used to determine the ratio of the timed periods in relation to sewage level.

Kubota does not disclose nor teach towards a process in which a predetermined aerobic/anoxic time period follows a variable period in which a specific DO level is reached. Therefore, Kubota does not anticipate claims 1 and 13, and their dependent claims 2 – 12 and 15 – 16.

Reconsideration and withdrawal of the rejection of claims 1 – 13 under 35 U.S.C. §102(b) as being anticipated by JP 7-136682 and JP 62-65797 both to Hitachi is respectfully requested.

Hitachi ('682) discloses an aeration system having an annular track in which aerobic and anaerobic states are controlled by an aerator that receives signals from a DO meter. Hitachi ('682) does not disclose or suggest the use of a fully mixed reactor oxidation ditch in which the sewage is treated by predetermined aerobic/anoxic time periods that follow variable periods in which certain DO levels are reached. Therefore Hitachi ('682) does not anticipate claims 1 and 13 or dependent claims 2 – 12.

Hitachi ('797) suggests an aeration system that employs a DO meter to control an aeration system thus providing aerobic and anaerobic phases between upper and lower DO limits. Hitachi ('797) does not disclose aerobic and anoxic phases that comprise a variable period in which a DO level is reached followed by a period of predetermined time. Therefore Hitachi ('797) does not anticipate claims 1 and 13 or dependent claims 2 – 12.

Reconsideration and withdrawal of the rejection of claims 1 – 16 under 35 U.S.C. §102(b) as being anticipated by JP 11-319884 to Suzuki is respectfully requested.

Suzuki suggests a sewage aeration device that has had a predefined aerobic period, during which a DO meter intermittently operates an aerator to ensure DO levels remain between limits. After this period an anaerobic period, also of predetermined time begins. Suzuki does not suggest a sewage treatment that includes periods of predetermined time, which follow variable periods in which a DO level is reached. Suzuki therefore does not anticipate claims 1 and 13 or their dependent claims 2-12 and 14-16.

Reconsideration and withdrawal of the rejection of claims 1 – 16 under 35 U.S.C. 102 (b) as being anticipated by WO 97/00832 to Goronszy is respectfully requested.

Goronszy discloses a system that monitors the oxygen utilisation rate of micro-organisms in the sewage. The aerator operates on a time cycle basis with means for setting the duration of the aeration sequence as measured and calculated from the oxygen utilisation rate. The optimum DO levels are maintained by control of the aeration sequences. Goronszy only teaches that measurement of the oxygen utilisation rate determines the aeration period and rate of supply for an

aeration phase. Goronszy does not suggest a treatment cycle that involves aerobic/anoxic periods of predetermined time that follow variable periods in which certain DO levels are reached. Thus, claims 1 and 13 are not anticipated and neither are their dependent claims 2 – 12 and 14 – 16.

Claim Rejections – 35 U.S.C. §103

Reconsideration and withdrawal of the rejection of claims 17-22 under 35 U.S.C. §103(a) as being unpatentable over any one of Tabata et al., Kubota, Hitachi ('682), Hitachi ('797), Suzuki et al, and Goronszy is respectfully requested.

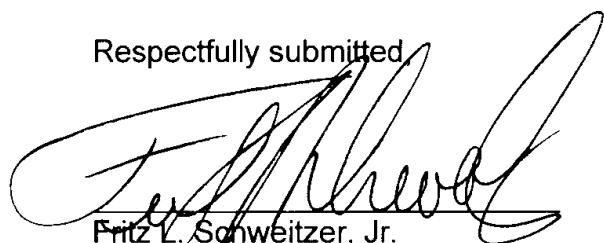
Claims 17-22 depend from at least claim 13. Claim 13, as now amended, defines a method of controlling an aerator that includes operating the aerator in phases that include an aerobic or anoxic period of predetermined time after a specific DO level is reached. This is not shown or suggested in the prior art and allows the aerator to operate effectively and efficiently. Thus, we submit that claims 17-22 are not obvious when dependent on their base claim, claim 13.

Conclusions

The prior art cited by the Examiner, but not relied upon, has been studied by the Applicant but is not considered to be relevant to the patentability of the claimed invention.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. An early notice of allowance is earnestly solicited.

Respectfully submitted,

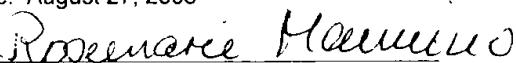


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Date: August 27, 2003



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